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CROWN GALL.

By

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The purpose of this circular bulletin is to call the attention of growers to the character of crown gall that they may exclude it from their orchards, and to give some suggestions to nurserymen about the prevention of it in nurseries. "Hairy root" is considered here with crown gall since they usually occur together and are considered by many to be forms of the same disease. This circular applies particularly to the disease on apple.

NAME AND CHARACTERISTICS.

The term crown gall is used to designate a disease affecting various fruit trees and other plants, and causing rough knots or enlargements on the roots, usually just below the surface of the ground, but often on the small roots lower down, and occasionally on the stem. The galls are usually easily distinguished from all other similar swellings by their peculiar rough, warty surface and somewhat hemispherical outline. Their character can best be indicated by the illustrations given on these pages. On apples the galls are usually accompanied by an abundance of fibrous roots. According to Popenoe young trees affected can be distinguished while in the ground by a growth of branches low down on the trunk late in the season. Aphis galls are quite different as shown by Plate V.

INJURIOUS CHARACTER.

The galls, when they occur on the main root, may interfere with the transfer of sap in the tree and thus weaken it. The constriction by the gall may cause the tree to fruit too young or to over bear. They cause

abnormal root development and thus hinder growth. They are often so well developed as to cut off and cause the death of the tap root which is almost always killed when affected throughout by the hairy-root condition. The tissue of the gall may decay and form an entrance for wood-rot fungi which will soon destroy the tree. The gall also weakens the trees at the crown, so that they are easily broken down by wind. The gall is especially destructive to peach and other stone fruits and to raspberries. Unless well developed when taken from the nursery, it probably does not seriously injure apple trees unless they are afterwards grown under unfavorable conditions. But many cases can be cited where apple trees have died from the gall or shown marked injury from it especially when young.

HISTORY.

Crown gall has been known in some nurseries for many years, but has in recent years become very prevalent, and is now found in most nurseries, and in a large part of the orchards in the southern and central parts of the United States. It does not occur so much in northern sections. Little notice, apparently, was taken of this affection before 1892, when the Department of Agriculture published a note regarding it. Following the thorough work of Toumey on this disease in Arizona, showing its destructive character on certain kinds of fruit trees, the attention of orchardists and nurserymen has been attracted to the disease, and it has been sometimes indiscriminately condemned on all classes of trees by nursery inspectors, and without consideration of the great loss to nurserymen.

INFECTIOUS CHARACTER.

Healthy plants of apple, peach, plum and raspberries have been by experiments, at the Missouri Experiment Station and elsewhere, successfully inoculated from galls taken from each of the before-mentioned kinds of fruits; indicating that the same germ is the cause of all and that the disease may spread from one to the other.

CAUSE.

Toumey found an organism in the almond galls, that he studied, which seemed to be the parasite causing them. Such parasites, however, have not been found by other investigators, but all evidence is in favor of such a cause. The disease is mostly introduced into nurseries on affected seedlings, which in apple are quite readily distinguished by the unusual amount of fibrous roots.

PREVENTION IN ORCHARDS.

Whenever nursery stock is purchased it should be carefully examined,

and none that is affected with gall should be planted. This is especially true of peach and raspberry, and the least indication of gall on these should be thrown out. Sometimes nurserymen cut off the galls before shipment, but such trees should not be purchased as the gall will almost always develop again when removed. Apple trees slightly affected, often apparently, recover and make good trees, but even then the life of the tree may be cut short and the ground infected. It is certainly best to plant unquestionably good trees rather than doubtful ones although they cost more, and in dealing with nurserymen this point should be considered.

Maryland nurseries are inspected for crown gall and proper arrangements made to prevent the sale of stock so diseased. Our nurserymen are especially careful to discard crown gall when digging, but it may come in from other States, and orchardists are advised to be on the lookout for it.

It will not be best to plant new orchards on ground where old orchards infected with crown gall stand or on ground draining from this.

For destroying the galls on trees many substances have been tested, but none can be recommended as satisfactory.

PREVENTION IN NURSERIES.

Do not use seedlings affected with "hairy root," or with indications of galls. If possible obtain seedlings from nurseries where crown gall is not present. Many recommend the French seedlings as cleaner, but others condemn them.

When possible plant on land where susceptible kinds of trees or plants have not been recently grown.

In grafting the disease may be communicated from diseased to healthy trees by means of knives, etc.

The wounds made in grafting, cultivating, etc., furnish points of entrance for germs of the gall, so such should be avoided or protected as much as possible; as a rule budded stock has less gall.

There seems to be more gall where the point of union in grafts is close to the surface of the field, the galls requiring air for development.

Some varieties are more susceptible to the disease.

The disease cannot be entirely prevented as it is so thoroughly distributed over the country, but since many nurseries are now free from it and the amount affected varies greatly from year to year in the same nursery, as different methods of planting, culture, etc., are followed, it certainly can, after nurserymen acquire more experience with it, be reduced enough that it will cause little financial loss.

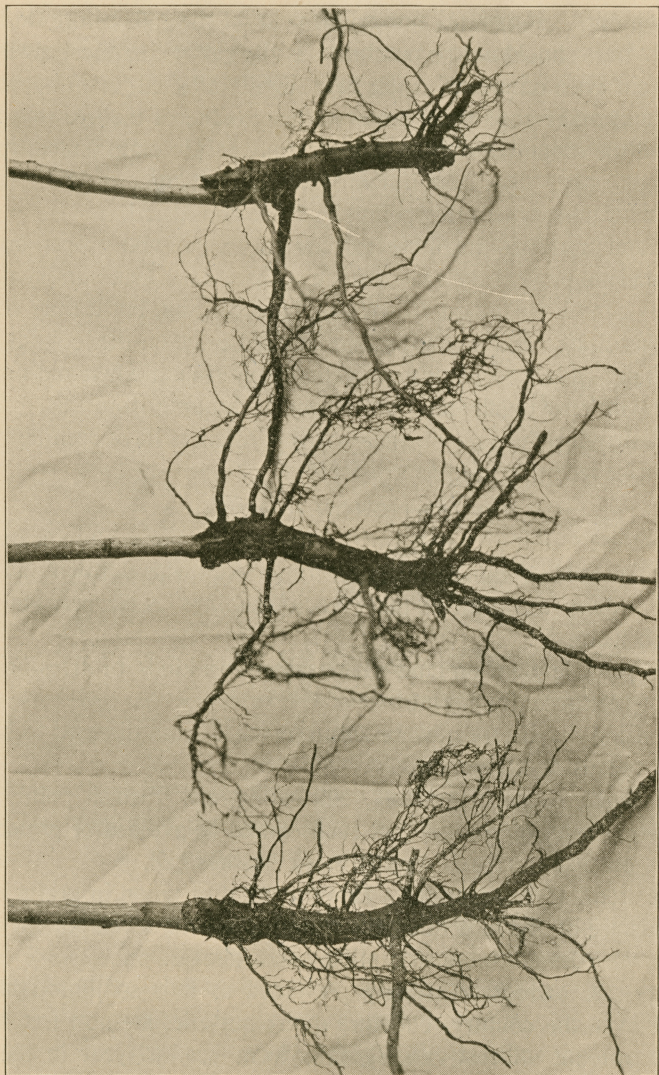


PLATE I—One-year apple grafts with healthy roots. (After Alwood.)



PLATE II—One-year apple grafts with "hairy roots." (After Alwood.)



PLATE III—Apple trees with crown gall, showing abnormal development of fibrous roots. (After Alwood.)

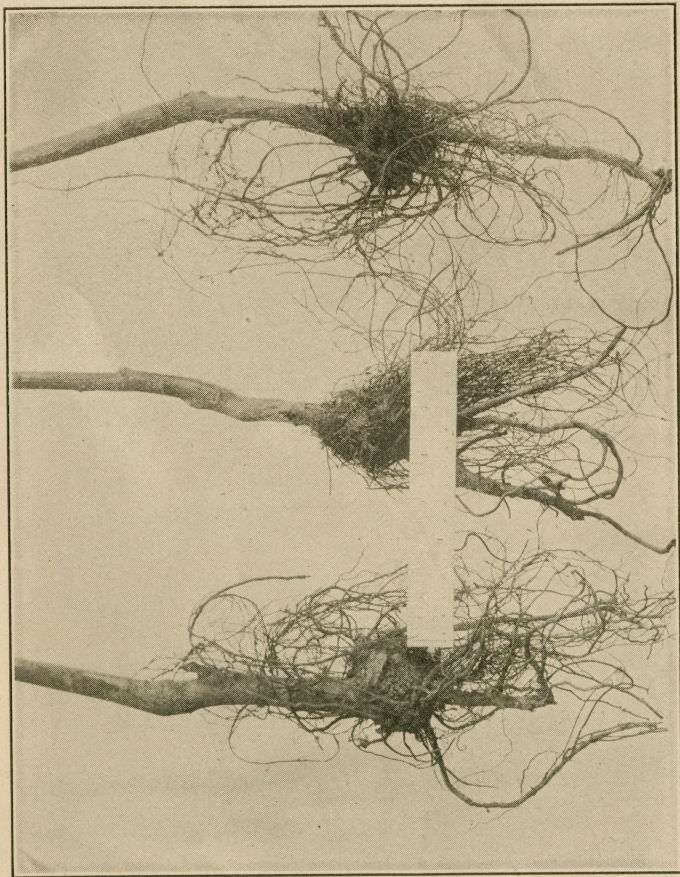


PLATE IV—Crown gall and hairy root of apple.

Root aphid effect on apple.

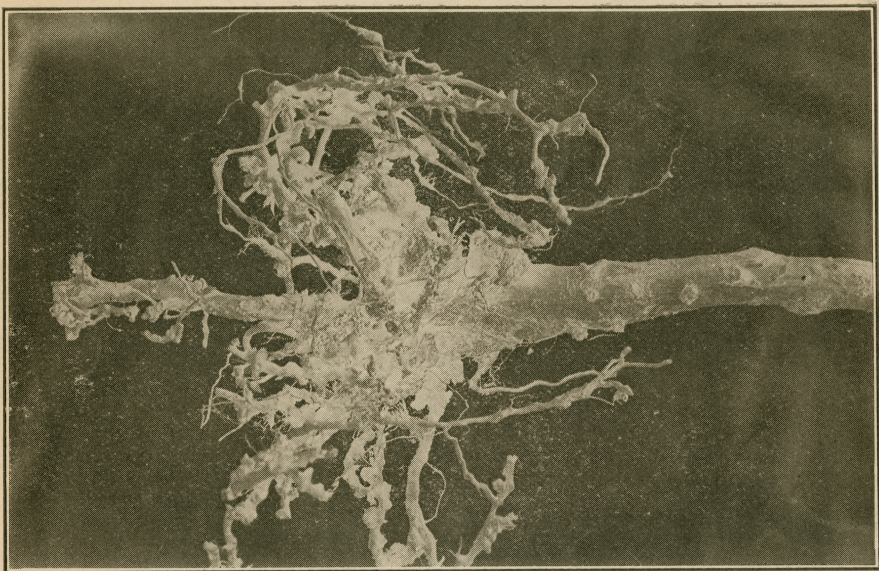


PLATE V.—Crown gall on peach.

